



November 28, 2012

Mr. Dwight Leisle
Port of Portland
7200 NE Airport Way
Portland, Oregon 97218

Re: Surface Soil Sampling Results – Operable Unit 2, Daimler Leasehold
Swan Island Upland Facility
Portland, Oregon
ECSI No. 271
1115-14

Dear Mr. Leisle:

This letter presents the surface soil sampling results to support the preparation of the Feasibility Study (FS) for Operable Unit 2 (the Facility or OU2) at the Swan Island Upland Facility (SIUF) in Portland, Oregon (Figures 1 and 2). The Port of Portland (Port) is under a Voluntary Cleanup Program (VCP) Agreement with the Oregon Department of Environmental Quality (DEQ) for Remedial Investigation (RI), Source Control Measures (SCMs), and FS at the Facility (dated July 24, 2006). The surface soil sampling discussed herein was conducted on July 21 and 22, 2012 at the Daimler leasehold of Operable Unit 2.

BACKGROUND

In the Human Health Risk Assessment (HHRA; Ash Creek, 2009), OU2 was divided into three exposure areas defined as follows (Figure 2):

- Daimler: This area includes the Daimler lease area together with the strip of land between the lease area and the line of ordinary high water (LOHW). The Daimler leasehold is used for truck trailer storage.
- Cemex: This area includes the Cemex lease area together with the strip of land between the lease area and the LOHW. The Cemex leasehold is used as a concrete batch plant.
- Berth 315: This area is the vacant strip of land between OU4 and the LOHW.

Unacceptable risks were identified for arsenic in soil in the Daimler exposure area. Consequently, an FS is being prepared. The FS will evaluate potential remedial actions to address soil remediation sufficient to reduce risk to acceptable risk levels. Additional soil data was necessary to better define the extent of surface soil impacts for evaluating the potential alternatives (e.g., capping versus removal). These data will also be used to prepare the Remedial Design/Remedial Action (RD/RA) Work Plan.

SAMPLING ACTIVITIES

Surface Soil Sampling

Thirty-five direct-push explorations (FS-1 through FS-35) were completed at the locations shown on Figure 3. Soil cores were obtained continuously from the ground surface to 3 feet below the ground surface (bgs) per Standard Operating Procedures (SOPs) 2.2 and 2.4 (Attachment A). Samples were collected in six-inch intervals (i.e., three samples per location; FS-1-1 taken from 0.25 inch to 0.75 inch bgs). Each sample was field-screened for volatile



organic compounds (VOCs) using a photoionization detector (PID) and for the presence of petroleum hydrocarbons using a sheen test in accordance with SOP 2.1 (Attachment A). Field screening did not identify the presence of VOCs or petroleum hydrocarbons. Field logs were maintained for each exploration (Attachment A).

After sampling activities were completed, each exploration was abandoned in accordance with Oregon Water Resources Department (OWRD) regulations and procedures. The abandonment procedure consisted of filling the exploration with granular bentonite and hydrating the bentonite with water. The surface was finished to match the surrounding materials.

Location Control. The sample locations were recorded using a high-accuracy, handheld global positioning system (GPS) device (Trimble® GeoXH™).

CHEMICAL ANALYSES

The soil samples were submitted to Apex Labs of Tigard, Oregon and analyzed for arsenic by EPA 6000 Series Methods on a normal turnaround basis. Copies of the laboratory reports are included in Attachment B (in CD-Rom format due to the length of the Level III deliverable report). The samples were analyzed on a standard turnaround time (up to 10 business days). A quality assurance review of the data was completed. No qualifiers were attached to the data as a result of our review.

RESULTS

Arsenic was detected above the default background concentration of 7 milligrams per kilogram (mg/kg; DEQ, 2010) in 14 of the 35 sample locations (Table 1). Only two samples collected from greater than 1 foot bgs exceeded the default background concentration (FS-2-2 at 11.1 mg/kg and FS-31-3 at 7.73 mg/kg). The overall distribution of arsenic in soil was consistent with historical results.

Sincerely,

Matt Thoenes
Staff, Engineering Group



EXMRS
12/31/12

Michael J. Pickering, R.G.
Senior Associate Hydrogeologist

REFERENCES

Ash Creek, 2009. *Baseline Human Health Risk Assessment, Operable Unit 2, Swan Island Upland Facility, Portland, Oregon*. September 1, 2009.

DEQ, 2010. *Human Health Risk Assessment Guidance*, Table 1, October 2010.



ATTACHMENTS

Table 1 – Arsenic Data

Figure 1 – Facility Location Map

Figure 2 – Facility Vicinity Map

Figure 3 – Exploration Plan

Attachment A – Field Information

Attachment B – Laboratory Data (CD-ROM)



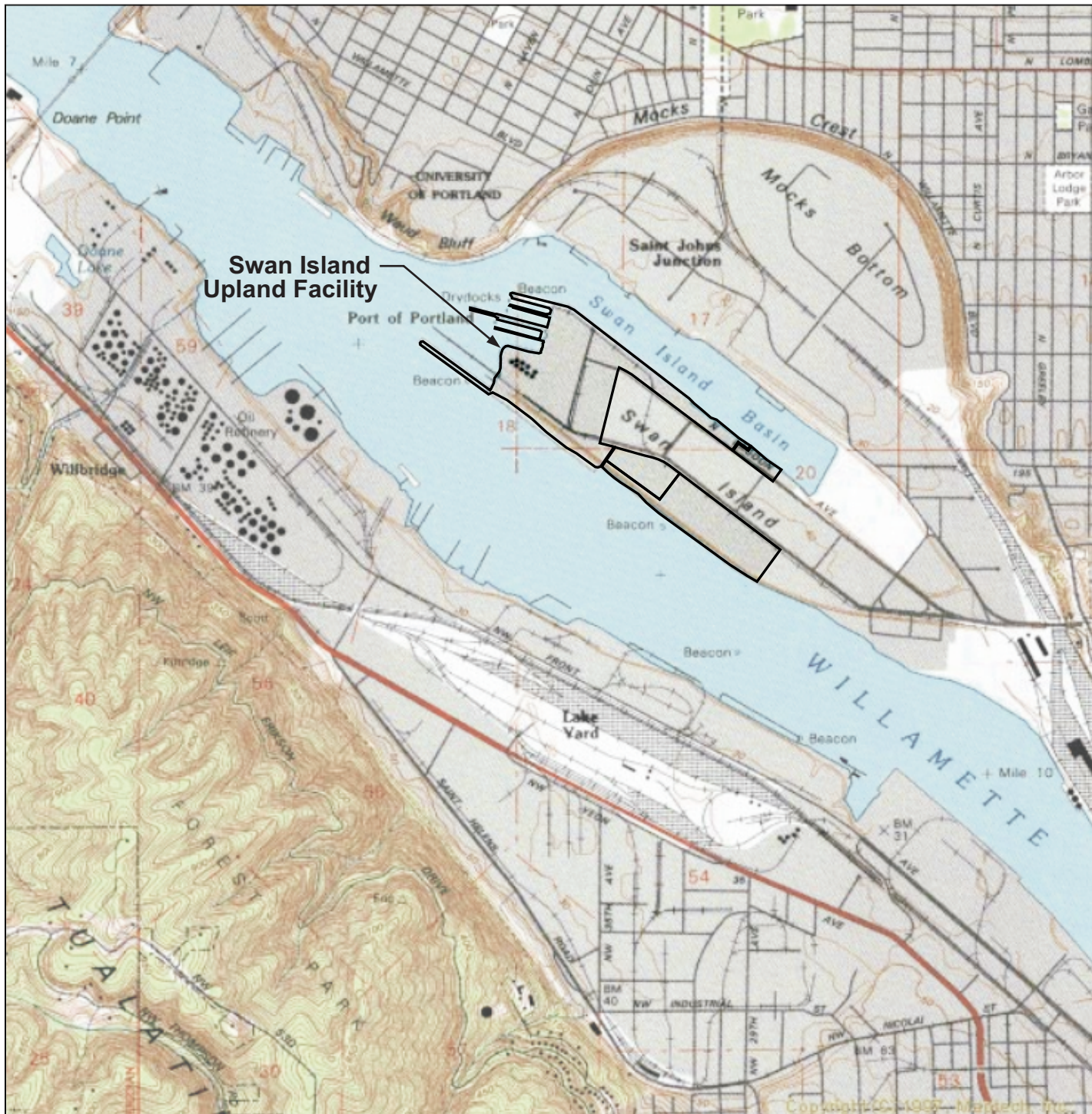
Table 1
Surface Soil Analytical Results - Operable Unit 2, Daimler Leasehold
Swan Island Upland Facility
Portland, Oregon

Sample Name	Sample Date	Arsenic Concentration in mg/kg (ppm)
FS-1-1	7/22/2012	4.42 J
FS-1-2	7/22/2012	2.97 J
FS-1-3	7/22/2012	4.11 J
FS-2-1	7/22/2012	4.29 J
FS-2-2	7/22/2012	11.1
FS-2-3	7/22/2012	2.56 J
FS-3-1	7/21/2012	6.42 J
FS-3-2	7/21/2012	4.49 J
FS-3-3	7/21/2012	5.01 J
FS-4-1	7/21/2012	4.59 J
FS-4-2	7/21/2012	4.15 J
FS-4-3	7/21/2012	5.28 J
FS-5-1	7/21/2012	4.10 J
FS-5-2	7/21/2012	2.62 J
FS-5-3	7/21/2012	3.77 J
FS-6-1	7/21/2012	5.77 J
FS-6-2	7/21/2012	5.66 J
FS-6-3	7/21/2012	3.91 J
FS-7-1	7/21/2012	3.24 J
FS-7-2	7/21/2012	4.96 J
FS-7-3	7/21/2012	3.69 J
FS-8-1	7/22/2012	39.3
FS-8-2	7/22/2012	4.35 J
FS-8-3	7/22/2012	4.80 J
FS-9-1	7/22/2012	23.8
FS-9-2	7/22/2012	3.38 J
FS-9-3	7/22/2012	3.16 J
FS-10-1	7/21/2012	3.21 J
FS-10-2	7/21/2012	3.97 J
FS-10-3	7/21/2012	4.00 J
FS-11-1	7/21/2012	6.17 J
FS-11-2	7/21/2012	3.63 J
FS-11-3	7/21/2012	3.89 J
FS-12-1	7/21/2012	2.21 J
FS-12-2	7/21/2012	3.71 J
FS-12-3	7/21/2012	5.04 J
FS-13-1	7/21/2012	3.22 J
FS-13-2	7/21/2012	4.59 J
FS-13-3	7/21/2012	4.02 J
FS-14-1	7/21/2012	3.67 J
FS-14-2	7/21/2012	4.87 J
FS-14-3	7/21/2012	4.16 J
FS-15-1	7/22/2012	3.83 J
FS-15-2	7/22/2012	3.67 J
FS-15-3	7/22/2012	3.66 J
FS-16-1	7/22/2012	13.9
FS-16-2	7/22/2012	2.61 J
FS-16-3	7/22/2012	4.42 J
FS-17-1	7/21/2012	4.13 J
FS-17-2	7/21/2012	3.47 J
FS-17-3	7/21/2012	3.72 J

Notes:

1. mg/kg (ppm) = Milligrams per kilogram (parts per million).
2. J = Estimated concentration.
3. Arsenic is analyzed by EPA Method 6010C.
4. Shaded values exceed DEQ default background concentration of 7 mg/kg

Sample Name	Sample Date	Arsenic Concentration in mg/kg (ppm)
FS-18-1	7/21/2012	2.30 J
FS-18-2	7/21/2012	2.80 J
FS-18-3	7/21/2012	<6.26
FS-19-1	7/21/2012	<4.49
FS-19-2	7/21/2012	<4.46
FS-19-3	7/21/2012	<5.27
FS-20-1	7/21/2012	5.25
FS-20-2	7/21/2012	<4.58
FS-20-3	7/21/2012	<5.01
FS-21-1	7/21/2012	<4.21
FS-21-2	7/21/2012	<5.03
FS-21-3	7/21/2012	<5.16
FS-22-1	7/22/2012	6.27
FS-22-2	7/22/2012	<4.04
FS-22-3	7/22/2012	<4.21
FS-23-1	7/22/2012	3.87 J
FS-23-2	7/22/2012	<5.59
FS-23-3	7/22/2012	<5.48
FS-24-1	7/21/2012	136
FS-24-2	7/21/2012	2.15 J
FS-24-3	7/21/2012	5.19 J
FS-25-1	7/21/2012	58.2
FS-25-2	7/21/2012	3.55 J
FS-25-3	7/21/2012	5.77 J
FS-26-1	7/21/2012	629
FS-26-2	7/21/2012	<4.92
FS-26-3	7/21/2012	<5.62
FS-27-1	7/21/2012	14
FS-27-2	7/21/2012	4.93
FS-27-3	7/21/2012	<3.99
FS-28-1	7/21/2012	6.72
FS-28-2	7/21/2012	4.87
FS-28-3	7/21/2012	<5.20
FS-29-1	7/22/2012	15.8
FS-29-2	7/22/2012	5.27 J
FS-29-3	7/22/2012	<4.51
FS-30-1	7/22/2012	29.3
FS-30-2	7/22/2012	<4.11
FS-30-3	7/22/2012	<4.12
FS-31-1	7/22/2012	8.43
FS-31-2	7/22/2012	3.70 J
FS-31-3	7/22/2012	7.73
FS-32-1	7/21/2012	122
FS-32-2	7/21/2012	4.68 J
FS-32-3	7/21/2012	<4.20
FS-33-1	7/21/2012	19.6
FS-33-2	7/21/2012	3.00 J
FS-33-3	7/21/2012	<4.18
FS-34-1	7/21/2012	11.6
FS-34-2	7/21/2012	6.21
FS-34-3	7/21/2012	<4.53
FS-35-1	7/21/2012	<4.31
FS-35-2	7/21/2012	4.72
FS-35-3	7/21/2012	<4.21



NOTE: Base map prepared from USGS 7.5-minute quadrangles as provided by Topozone. (1990)

0 2,000 4,000
Approximate Scale in Feet



Facility Location Map

Surface Soil Sampling Results Letter - Daimler Leasehold
Swan Island Upland Facility Operable Unit 2
Portland, Oregon



Ash Creek Associates
A Division of Apex Companies, LLC



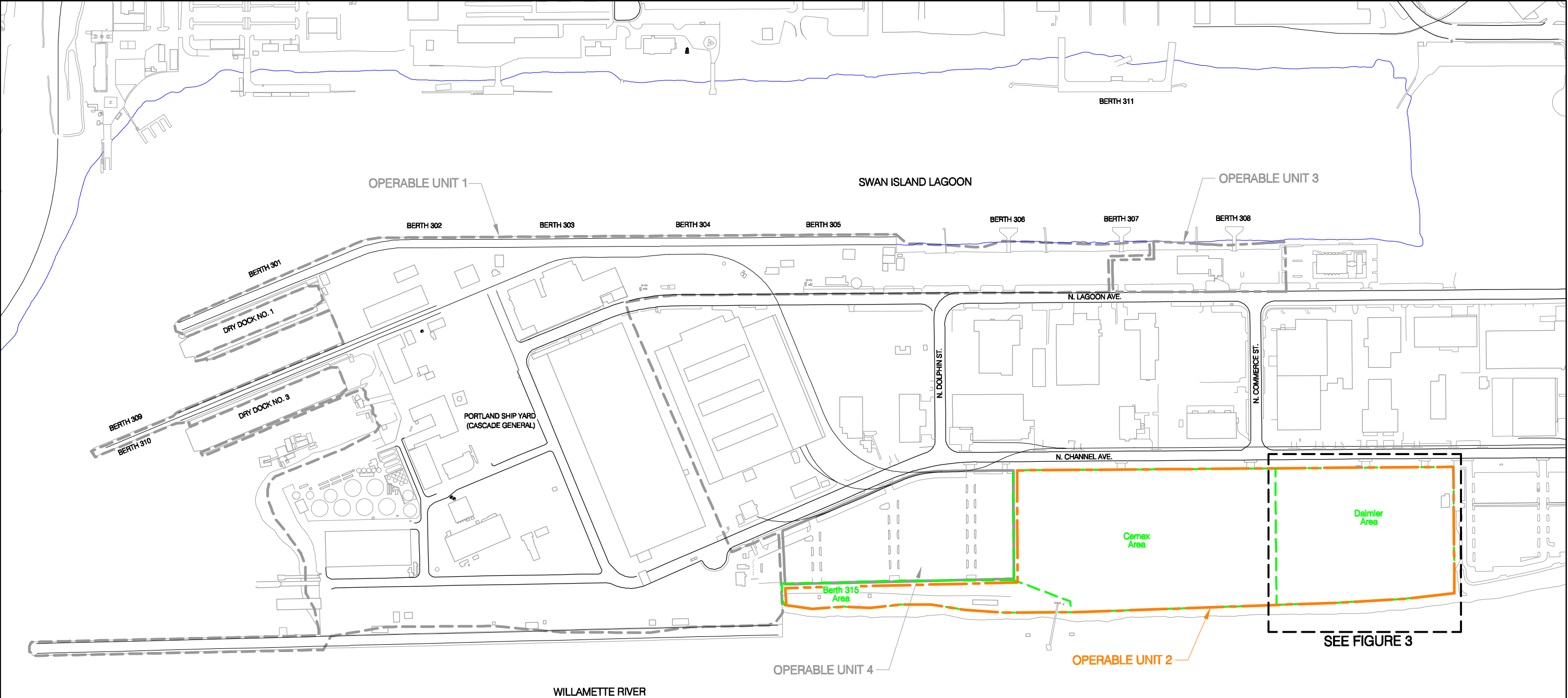
Project Number

1115-14


Figure

September 2012


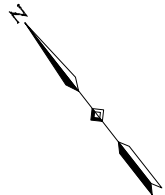
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Legend:

- Operable Unit 1 Boundary
- Operable Unit 2 Boundary
- Operable Unit 3 Boundary
- Operable Unit 4 Boundary
-  Exposure Area


NOTE:
1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.

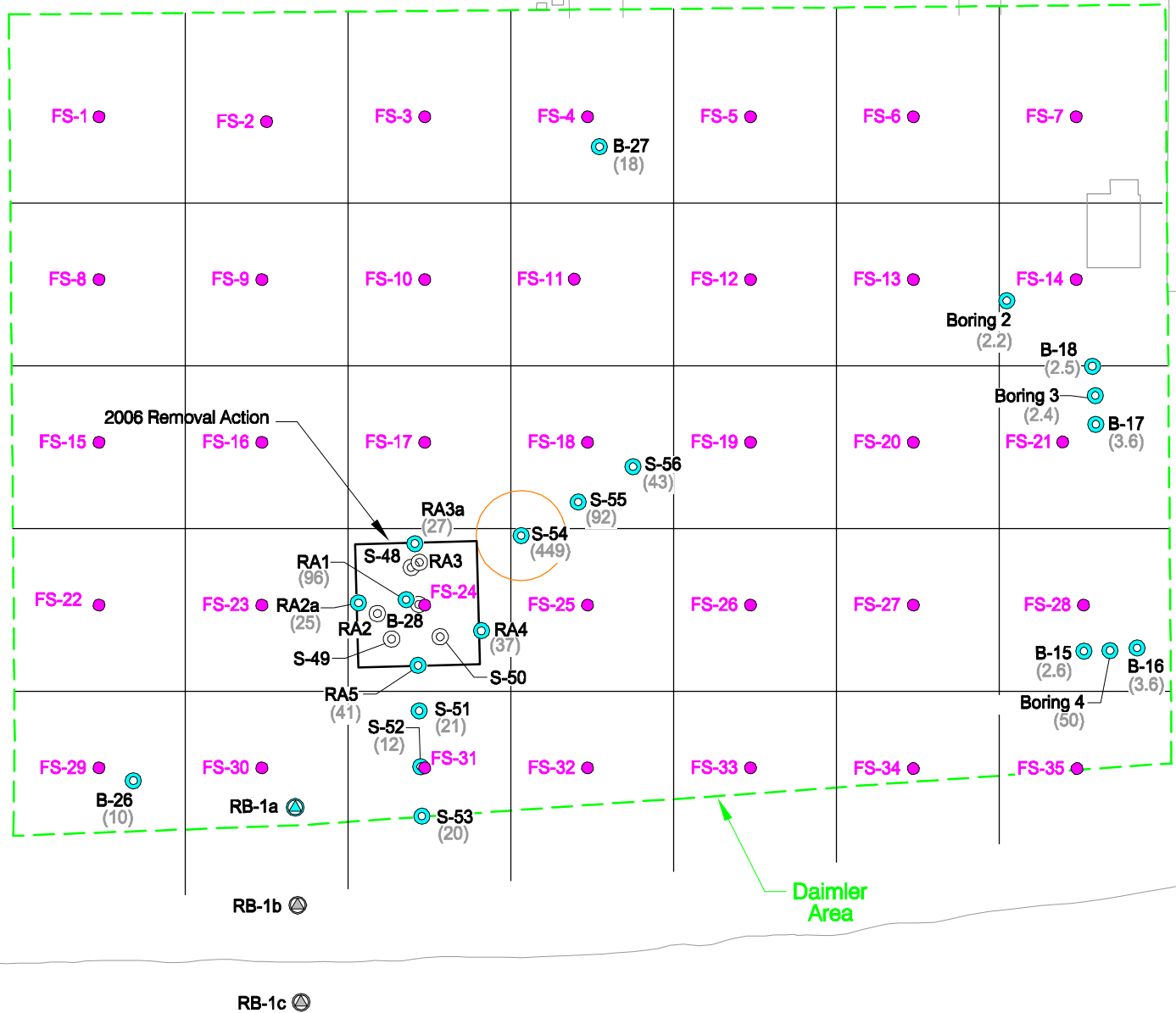


Scale in Feet

Facility Vicinity Plan

Surface Soil Sampling Results Letter - Daimler Leasehold
Swan Island Upland Facility Operable Unit 2
Portland, Oregon

 Ash Creek Associates <small>A Division of Apex Companies, LLC</small>	Project Number 1115-14	Figure 2
September 2012		



Legend:

B-26 (10) Soil Sampling Location
Historical Arsenic Concentration (0-3 Feet) in mg/kg

RB-1a Riverbank Soil Sampling Location

B-28 Soil Sampling Location (Soil Removed from
Location Where Sample was Collected)

Exposure Area

Soil Hot Spot

100-Foot Grid with
2012 Exploration Location

NOTES:

1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.
2. Aerial photograph from 2010 - Google Imagery dated June 19, 2008.

Exploration Plan

Surface Soil Sampling Results Letter - Daimler Leasehold
Swan Island Upland Facility Operable Unit 2
Portland, Oregon



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Project Number

1115-14


September 2012



Figure














3















Attachment A


Field Information


 Ash Creek Associates A Division of Apex Companies, LLC					Port of Portland SIUF Daimler					Boring Numbers: 1, 2, and 3 Project Number: 1115-14.001 Logged By: M. Whitson Date: July 21-22, 2012 Site Conditions: Overcast/Cloudy/60s (°F) Drilling Contractor: Pacific Soil and Water Drilling Equipment: Geoprobe 6600 Sampler Type: 3.5" core Barrel Depth to Water (ATD): -- Surface Elevation: Not Measured				
Depth, feet	Core Interval/Recovery	Laboratory Sample ID	PID	Sheen	Material Description									
										Boring Number: FS-1				
										Date: July 22, 2012				
1		FS-1-1	<5	NS	Surface GRAVEL.					1				
		FS-1-2	<5	NS	SAND with SILT (SP); brown (7.5YR 4/3), moist, loose, 90-95% very fine to fine sand, 5-10% LP silt fines).									
		FS-1-3	<5	NS	Gravelly SAND (SP); very dark gray (7.5YR 3/1), moist, loose, 75-80% fine to medium sand, 20-25% fine, rounded gravels).									
4					Bottom of Boring at 3.25' BGS.					4				
										Boring Number: FS-2				
										Date: July 22, 2012				
1		FS-2-1	<5	NS	Gravelly SAND (SP); very dark gray (7.5YR 3/1), slightly moist, medium dense, (65% fine to medium sand, 35% fine to medium, angular gravels).					1				
		FS-2-2	<5	NS										
		FS-2-3	<5	NS	SAND (SP); dark brown (7.5YR 3/2), moist, loose, (<5% fines, fine to medium sand). ~5% fine, rounded gravel.									
4					Bottom of Boring at 3.0' BGS.					4				
										Boring Number: FS-3				
										Date: July 21, 2012				
1		FS-3-1	<5	NS	Gravelly SAND (SP); dark gray (7.5YR 3/2), moist, dense, (80% fine to medium sand, 20% gravel).					1				
		FS-3-2	<5	NS	SAND (SP); dark brown (7.5YR 3/4), moist, medium dense, (<5% fines, fine to medium sand).									
		FS-3-3	<5	NS	Becomes loose, gray (7.5YR 5/1).									
4					Bottom of Boring at 3.0' BGS.					4				


 Ash Creek Associates <small>A Division of Apex Companies, LLC</small> 					Port of Portland SIUF Daimler		Boring Numbers: 4, 5, and 6	
							Project Number: 1115-14.001	
							Logged By: M. Whitson	
							Date: July 21-22, 2012	
Depth, feet	Core Interval/Recovery	Laboratory Sample ID	PID	Sheen	Material Description	Site Conditions: Overcast/Cloudy/60s (°F)		
						Drilling Contractor: Pacific Soil and Water		
						Drilling Equipment: Geoprobe 6600		
						Sampler Type: 3.5" core Barrel		
						Depth to Water (ATD): --		
							Surface Elevation: Not Measured	
							Boring Number: FS-4	
							Date: July 21, 2012	
1					Sandy GRAVEL (GP); dark brown (7.5YR 3/2), slightly moist, medium dense, (60% angular gravel, 40% fine to medium sand).	1		
					SAND (SP); brown (7.5YR 3/3), slightly moist, loose, (<5% fines, very fine to fine sand).			
					Silty SAND (SP); dark brown (7.5YR 3/4), moist, medium dense, (70% very fine to fine sand, 30% LP silt).			
					SAND (SP); dark brown (7.5YR 3/2), moist, loose, (<5% fines, fine to medium grained).			
4					Bottom of Boring at ~3.0' BGS.	4		
							Boring Number: FS-5	
							Date: July 21, 2012	
1					GRAVEL and ASPHALT surface.	1		
					Gravelly, silty SAND (SM); dark brown (7.5YR 3/4), moist, loose, (70% very fine to fine sand, 20% silt, 10% gravel).			
					SAND (SP); brown (7.5YR 5/2), dry, loose, (<5% fines, very fine to medium sand).			
4					Bottom of Boring at 3.0' BGS.	4		
							Boring Number: FS-6	
							Date: July 21, 2012	
1					GRAVEL and ASPHALT surface.	1		
					Gravelly, silty SAND (SM); dark brown (7.5YR 3/4), moist, loose, (70% very fine to fine sand, 20% silt, 10% gravel).			
					SAND (SP); brown (7.5YR 5/2), dry, loose, (<5% fines, very fine to medium sand).			
4					Bottom of Boring at ~3.0' BGS.	4		





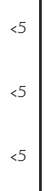









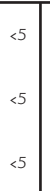






 Ash Creek Associates A Division of Apex Companies, LLC					Port of Portland SIUF Daimler					Boring Numbers: 7, 8, and 9				
										Project Number: 1115-14.001				
										Logged By: M. Whitson				
										Date: July 21-22, 2012				
Depth, feet Core Interval/Recovery Laboratory Sample ID PID Sheen	Material Description									Site Conditions: Overcast/Cloudy/60s (°F)				
										Drilling Contractor: Pacific Soil and Water				
										Drilling Equipment: Geoprobe 6600				
										Sampler Type: 3.5" core Barrel				
										Depth to Water (ATD): --				
										Surface Elevation: Not Measured				
										Boring Number: FS-7				
										Date: July 21, 2012				
		FS-7-1 FS-7-2 FS-7-3	<5 <5 <5	NS NS NS	Silty, sandy GRAVEL (GM); very dark gray (7.5YR 3/1), moist, loose, (70% medium to coarse, angular gravel, 20% medium sand, 10% LP silt).									
					Silty SAND (SM); brown (7.5YR 4/4), moist, medium dense, (75% very fine to fine sand, 25% LP silt).									
					SAND (SP); brown (7.5YR 4/4), moist, medium dense, (<5% fines, very fine to fine grained).									
					Bottom of Boring at ~3.0' BGS.									
										Boring Number: FS-8				
										Date: July 22, 2012				
		FS-8-1 FS-8-2 FS-8-3	<5 <5 <5	NS NS NS	Gravelly SAND (SP); gray (7.5YR 6/1), dry, loose, (60-65% fine to medium sand, 35-40% fine to medium, angular gravel).									
					— Becomes dark gray (7.5YR 3/1).									
					Bottom of Boring at ~3.0' BGS.									
										Boring Number: FS-9				
										Date: July 21, 2012				
		FS-9-1 FS-9-2 FS-9-3	<5 <5 <5	NS NS NS	Gravelly SAND (SP); dark gray (7.5YR 4/1), slightly moist, medium dense, 60% fine to medium sand, 40% fine to medium, angular gravels).									
					SAND (SP); dark brown (7.5YR 3/2), moist, loose, (<5% fines, fine to medium grained).									
					Bottom of Boring at ~3.0' BGS.									

 Ash Creek Associates <small>A Division of Apex Companies, LLC</small> 					Port of Portland SIUF Daimler		Boring Numbers: 10, 11, and 12	
							Project Number: 1115-14.001	
							Logged By: M. Whitson	
							Date: July 21-22, 2012	
Depth, feet	Core Interval/Recovery	Laboratory Sample ID	PID	Sheen	Material Description	Site Conditions: Overcast/Cloudy/60s (°F)		
						Drilling Contractor: Pacific Soil and Water		
						Drilling Equipment: Geoprobe 6600		
						Sampler Type: 3.5" core Barrel		
						Depth to Water (ATD): --		
						Surface Elevation: Not Measured		
							Boring Number: FS-10	
							Date: July 21, 2012	
1 		FS-10-1 FS-10-2 FS-10-3	<5 <5 <5	NS NS NS	Sandy GRAVEL (GP); gray (7.5YR 6/1), dry, dense, 65% fine to coarse, angular to rounded gravel, 35% fine to medium sand). — Becomes dark brown (7.5YR 3/3), slightly moist. — Brick fragments. Bottom of Boring at ~3.0' BGS.	1 		
							Boring Number: FS-11	
							Date: July 21, 2012	
1 		FS-11-1 FS-11-2 FS-11-3	<5 <5 <5	NS NS NS	Sandy GRAVEL surface. Gravelly SAND (SP); brown (7.5YR 4/3), slightly moist, medium dense, 75% fine to medium sand, 25% fine to medium gravel). — 5 inches of concrete. SAND (SP); brown (7.5YR 4/3), slightly moist, medium dense, (<5% fines, fine to medium grained). — 4 inches of concrete. Silty SAND; brown (7.5YR 4/3), moist, medium dense. Bottom of Boring at 3.0' BGS.	1 		
							Boring Number: FS-12	
							Date: July 21, 2012	
1 		FS-12-1 FS-12-2 FS-12-3	<5 <5 <5	NS NS NS	Gravelly SAND (SP); dark brown (7.5YR 3/4), slightly moist, dense, (60% fine to medium sand, 40% medium, angular gravel). — SAND (SP); dark brown (7.5YR 3/4), moist, loose, (<5% fines, medium sand). — Gravelly SAND (SP); dark brown (7.5YR 3/4), slightly moist, dense, (60% fine to medium sand, 40% medium, angular gravel). Bottom of Boring at ~3.0' BGS.	1 		

 Ash Creek Associates A Division of Apex Companies, LLC					Port of Portland SIUF Daimler					Boring Numbers: 16, 17, and 18 Project Number: 1115-14.001 Logged By: M. Whitson Date: July 21-22, 2012 Site Conditions: Overcast/Cloudy/60s (°F) Drilling Contractor: Pacific Soil and Water Drilling Equipment: Geoprobe 6600 Sampler Type: 3.5" core Barrel Depth to Water (ATD): -- Surface Elevation: Not Measured				
Depth, feet	Core Interval/Recovery	Laboratory Sample ID	PID	Sheen	Material Description									
										Boring Number: FS-16				
										Date: July 22, 2012				
1		FS-16-1	<5	NS	Gravelly SAND (SP); dark brown (7.5YR 3/3), moist, medium dense, (70% fine to medium sand, 30% medium, angular gravel). Becomes very dark gray (7.5YR 3/1),					1				
		FS-16-2	<5	NS										
		FS-16-3	<5	NS	SAND (SP); dark brown (7.5YR 3/2), moist, loose, fine to medium grained, (<5% fines).									
4					Bottom of Boring at 3.25' BGS.					4				
										Boring Number: FS-17				
										Date: July 21, 2012				
1		FS-17-1	<5	NS	Sandy GRAVEL (GP); gray (7.5YR 6/1), dry, dense, (60% gravel, 40% fine to medium sand).					1				
		FS-17-2	<5	NS	SAND with silt (SP); brown (7.5YR 4/3), moist, medium dense, (90-95% very fine to fine sand, 5-10% LP silt).									
		FS-17-3	<5	NS	Silt increases to 30%; silty SAND (SM).									
4					Bottom of Boring at ~3.0' BGS.					4				
										Boring Number: FS-18				
										Date: July 21, 2012				
1		FS-18-1	<5	NS	Sandy GRAVEL (GP); brown (7.5YR 4/2), slightly moist, dense, (65% fine to medium, angular gravel, 35% fine to medium sand).					1				
		FS-18-2	<5	NS	SAND (SP); brown (7.5YR 4/3), moist to wet, medium dense, (65% very fine to fine sand, 35% LP silt).									
		FS-18-3	<5	NS	Silty SAND (SM); brown (7.5YR 4/4), moist to wet, medium dense, (65% very fine to fine sand, 35% LP silt).									
4					Bottom of Boring at ~3.0' BGS.					4				

 Ash Creek Associates A Division of Apex Companies, LLC					Port of Portland SIUF Daimler					Boring Numbers: 22, 23, and 24 Project Number: 1115-14.001 Logged By: M. Whitson Date: July 21-22, 2012 Site Conditions: Overcast/Cloudy/60s (°F) Drilling Contractor: Pacific Soil and Water Drilling Equipment: Geoprobe 6600 Sampler Type: 3.5" core Barrel Depth to Water (ATD): -- Surface Elevation: Not Measured				
Depth, feet	Core Interval/Recovery	Laboratory Sample ID	PID	Sheen	Material Description									
										Boring Number: FS-22				
										Date: July 21, 2012				
1		FS-22-1	<5	NS	Gravelly SAND (SP); dark brown (7.5YR), moist, medium dense, (70% fine to medium sand, 30% fine to medium, angular gravel),					1				
		FS-22-2	<5	NS										
		FS-22-3	<5	NS	SAND (SP); very dark brown (7.5YR 2.5/2), moist, loose, (<5% fines, fine to medium grained).									
4					Bottom of Boring at 3.0' BGS.					4				
										Boring Number: FS-23				
										Date: July 21, 2012				
1		FS-23-1	<5	NS	Gravelly SAND (SP); dark gray (7.5YR 4/1), slightly moist, medium dense, (80% fine to medium sand, 20% fine to medium, angular gravel).					1				
		FS-23-2	<5	NS	Silty SAND (SM); brown (7.5YR 4/3), slightly moist, medium dense, (75% very fine to fine sand, 25% LP silt).									
		FS-23-3	<5	NS	Sandy SILT (ML); very dark gray (7.5YR 3/1), moist, medium stiff, (75% LP silt, 25% very fine to fine sand).									
4					Bottom of Boring at ~3.0' BGS.					4				
										Boring Number: FS-24				
										Date: July 21, 2012				
1		FS-24-1	<5	NS	Very gravelly SAND (SP); brown (7.5YR 5/2), slightly moist, dense, (55% fine to medium sand, 45% gravel).					1				
		FS-24-2	<5	NS										
		FS-24-3	<5	NS	Clayey SILT (ML); very dark gray (7.5YR 3/1), moist, stiff, (70% LP silt, 30% clay).									
4					Silty SAND (SM); dark brown (7.5YR 3/4), moist, dense, (70% fine sand, 30% silt).					4				
										Bottom of Boring at ~3.0' BGS.				

 Ash Creek Associates A Division of Apex Companies, LLC					Port of Portland SIUF Daimler					Boring Numbers: 31, 32, and 33 Project Number: 1115-14.001 Logged By: M. Whitson Date: July 21-22, 2012 Site Conditions: Overcast/Cloudy/60s (°F) Drilling Contractor: Pacific Soil and Water Drilling Equipment: Geoprobe 6600 Sampler Type: 3.5" core Barrel Depth to Water (ATD): -- Surface Elevation: Not Measured				
Depth, feet	Core Interval/Recovery	Laboratory Sample ID	PID	Sheen	Material Description									
										Boring Number: FS-31				
										Date: July 21, 2012				
1		FS-31-1	<5	NS	Gravelly SAND (SP); dark brown (7.5YR 3/4), slightly moist, medium dense (65% fine to medium sand, 35% fine to medium gravel).					1				
		FS-31-2	<5	NS	Sandy SILT (ML); black (7.5YR 2.5/1), slightly moist, medium stiff, (60% LP silt, 40% very fine to fine sand).									
		FS-31-3	<5	NS	Clayey SILT (ML); black (7.5YR 2.5/1), moist, medium stiff, (65-70% LP silt, 30-35% clay). 1-inch SAND (SP) lens; fine to medium grained.									
4					Bottom of Boring at ~3.0' BGS.					4				
										Boring Number: FS-32				
										Date: July 21, 2012				
1		FS-32-1	<5	NS	Sandy GRAVEL (GP); dark brown (7.5YR 3/2), dry to moist, dense, (60% medium, angular gravel, 40% medium sand).					1				
		FS-32-2	<5	NS	Silty SAND (SM); dark brown (7.5YR 3/3), slightly moist, dense, (75% very fine to fine sand, 25% silt).									
		FS-32-3	<5	NS	SAND (SP); brown (7.5YR 4/3), slightly moist, loose, (<5% fines, fine to medium sand).									
4					Bottom of Boring at ~3.25' BGS.					4				
										Boring Number: FS-33				
										Date: July 21, 2012				
1		FS-33-1	<5	NS	Gravelly SAND (SP); dark gray (7.5YR 4/1), slightly moist, dense, (60% fine to medium sand, 40% fine to medium, angular gravel)					1				
		FS-33-2	<5	NS	SAND (SP); brown (7.5YR 4/3), moist, loose, (<5% fines, fine to medium grained).									
		FS-33-3	<5	NS										
4					Bottom of Boring at 3.0' BGS.					4				

 Ash Creek Associates A Division of Apex Companies, LLC					Port of Portland SIUF Daimler					Boring Numbers: 34 and 35 Project Number: 1115-14.001 Logged By: M. Whitson Date: July 21-22, 2012 Site Conditions: Overcast/Cloudy/60s (°F) Drilling Contractor: Pacific Soil and Water Drilling Equipment: Geoprobe 6600 Sampler Type: 3.5" core Barrel Depth to Water (ATD): -- Surface Elevation: Not Measured									
Depth, feet	Core Interval/Recovery	Laboratory Sample ID	PID	Sheen	Material Description														
										Boring Number: FS-34 Date: July 21, 2012									
					Gravelly SAND (SP); dark gray (7.5YR 4/1), slightly moist, medium dense, (60-65% fine to medium sand, 35-40% medium coarse gravel).														
					Silty SAND (SM); brown (7.5YR 4/2), moist, dense, 75% fine to medium sand, 25% LP silt, occasional gravel).														
					Gravelly SAND (SP); dark gray (7.5YR 4/1), slightly moist, medium dense, (60-65% fine to medium sand, 35-40% medium coarse gravel).														
					Bottom of Boring at ~3.0' BGS.														
															Boring Number: FS-35 Date: July 21, 2012				
					Sandy GRAVEL surface cover.														
					Gravelly SAND (SP); brown (7.5YR 4/2), moist, medium dense, (65% fine to medium sand, 35% angular gravel).														
					SAND (SP); brown (7.5YR 4/4), moist, medium dense, (<5% fines, fine to medium sand).														
					Becomes loose.														
Bottom of Boring at 3.0' BGS.																			

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) provides instructions for standard field screening. Field screening results are used to aid in the selection of soil samples for chemical analysis. This procedure is applicable during all Ash Creek Associates (ACA) soil sampling operations.

Standard field screening techniques include the use of a photoionization detector (PID) to assess for volatile organic compounds (VOCs), for the presence of petroleum hydrocarbons using a sheen test, and for non-aqueous phase liquids (NAPLs) using dyes and UV light. These methods will not detect all potential contaminants, so selection of screening techniques shall be based on an understanding of the site history. The PID is not compound or concentration-specific, but it can provide a qualitative indication of the presence of VOCs. PID measurements are affected by other field parameters such as temperature and soil moisture.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- PID with calibration gas (record daily calibration/calibration check in field notes)
- Glass jars (with aluminum foil) or resealable bags
- NAPL Dye (such as OilScreen DNAPL-Lens) if needed for NAPL screening
- UV Light Box (if needed for NAPL screening)

3. METHODOLOGY

Each soil sample will be field screened for VOCs using a PID (with a 10.2 eV probe) and for the presence of petroleum hydrocarbons using a sheen test. If the presence of NAPLs is suspected, then screening using dye and UV light is also to be completed. The PID used on site will be calibrated on a daily basis according to the manufacturer's specifications. The PID is also used as a safety tool. The PID can be used to monitor air during activities where vapors may be present in the breathing space. Document all calibration activities and field observations per SOP 1.1. The field screening procedures are summarized below.

PID Calibration Procedure:

- Zero the PID using ambient air from the general area where the work will be done.
- A standard gas of 100 ppm isobutylene gas is then used to calibrate the PID. If questionable readings are encountered, the PID will be recalibrated using new 100 ppm isobutylene gas.

PID Screening Procedure:

- Place a representative portion (approximately one ounce) of freshly exposed, uncompacted soil into a clean resealable plastic bag or glass jar.
- Seal the bag or jar (with aluminum foil) and shake to expose vapors from the soil matrix.
- Allow the bag to sit to reach ambient temperature.
- Carefully insert the intake port of the PID into the plastic bag or jar.
- Record the sample concentration in the field notes.

Sheen Test Procedure:

- Following the PID screen, add enough water to the bag/jar to cover the sample.
- Observe the water surface for signs of discoloration/sheen and characterize.

No Sheen (NS)	No visible sheen on the water surface
Slight Sheen (SS)	Light, colorless, dull sheen, irregular spread, not rapid. Biological content may produce a slight sheen (typically platy/blocky).
Moderate Sheen (MS)	Light to heavy coverage, may have some color/iridescence, spread is irregular to flowing, few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen coverage with color/iridescence, spread is rapid, entire water surface may be covered with sheen.

NAPL Dye Procedure:

- Dye can be either liquid form, dissolvable tablet, or spray applied.
- Follow manufacturers instructions for specific product used.
- NAPL testing is completed after other field screening and sample collection is complete.
- For OilScreen DANPL-Lens dye, the remaining soil sample is sprayed along its length so the soil surface is visibly wetted. A royal blue color of the dye about one minute after spraying would be considered a positive indication of NAPL.

UV Light Screening Procedure:

- UV Light Screening involves placement of a portion of the soil sample into a resealable plastic bag (which can be the same as used for PID screening, but before sheen test is performed).
- The sample was then examined in a dark space under UV light using a small, portable UV light box.
- The plastic bag is manipulated during examination to squeeze fluid against the bag beneath the lamp.
- Fluorescence (glowing color) indicates presence of NAPLs.

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods used for obtaining surface soil samples for physical and/or chemical analysis. For purposes of this SOP, surface soil (including shallow subsurface soil) is loosely defined as soil that is present within 3 feet of the ground surface at the time of sampling. Various types of sampling equipment are used to collect surface soil samples including spoons, scoops, trowels, shovels, and hand augers.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Spoons, scoops, trowels, shovels, and/or hand augers. Stainless steel is preferred.
- Stainless steel bowls
- Laboratory-supplied sample containers
- Field documentation materials
- Decontamination materials
- Personal protective equipment (as required by Health and Safety Plan)

3. METHODOLOGY

Project-specific requirements will generally dictate the preferred type of sampling equipment used at a particular site. The following parameters should be considered: sampling depth, soil density, soil moisture, use of analyses (e.g., chemical versus physical testing), type of analyses (e.g., volatile versus non-volatile). Analytical testing requirements will indicate sample volume requirements that also will influence the selection of the appropriate type of sampling tool. The project sampling plan should define the specific requirements for collection of surface soil samples at a particular site.

Collection of Samples

- **Volatile Analyses.** Surface soil sampling for volatile organics analysis (VOA) is different than other routine physical or chemical testing because of the potential loss of volatiles during sampling. To limit volatile loss, the soil sample must be obtained as quickly and as directly as possible. If a VOA sample is to be collected as part of a multiple analyte sample, the VOA sample portion will be obtained first. The VOA sample should be obtained from a discrete portion of the entire collected sample and should not be composited or homogenized. Sample bottles should be filled to capacity, with no headspace. Specific procedures for collecting VOA samples using the EPA Method 5035 are discussed in SOP 2-7.
- **Other Analyses.** Once the targeted sample interval has been collected, the soil sample will be thoroughly homogenized in a stainless steel bowl prior to bottling. Sample homogenizing is accomplished by manually mixing the entire soil sample in the stainless steel bowl with the sampling tool or with a clean teaspoon or spatula until a uniform mixture is achieved. If packing of the samples into the bottles is necessary, a clean stainless steel teaspoon or spatula may be used.

General Sampling Procedure:

- Decontaminate sampling equipment in accordance with the Sampling and Analysis Plan (SAP) before and after each individual soil sample.
- Remove surface debris that blocks access to the actual soil surface or loosen dense surface soils, such as those encountered in heavy traffic areas. If sampling equipment is used to remove surface debris,

the equipment should be decontaminated prior to sampling to reduce the potential for sample interferences.

- When using a hand auger, push and rotate downward until the auger becomes filled with soil. Usually a 6- to 12-inch long core of soil is obtained each time the auger is inserted. Once filled, remove the auger from the ground and empty into a stainless steel bowl. If a VOA sample is required, the sample should be taken directly from the auger using a teaspoon or spatula and/or directly filling the sample container from the auger. Repeat the augering process until the desired sample interval has been augered and placed into the stainless steel bowl.

Backfilling Sample Locations:

Backfill in accordance with federal and state regulations including OAR 690-240 (e.g., bentonite requirements). The soils from the excavation will be used as backfill unless project-specific or state requirements include the use of clean backfill material.

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods for observing and sampling from push-probes (i.e., GeoProbe™). Subsurface soil cores may be obtained using this system for purposes of determining subsurface soil conditions and for obtaining soil samples for physical and/or chemical evaluation. Grab groundwater samples may be collected using temporary well screens. Soil vapor samples may be obtained using temporary well points. Shallow (less than 50 feet), small-diameter (2-inch max) pre-packed wells may also be installed using push-probe equipment. This procedure is applicable during all Ash Creek Associates (ACA) push-probe activities.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Traffic cones, measuring tape, spatula, and buckets/drums
- Sampling equipment (water level probe, pumps, tubing) and laboratory-supplied sample containers
- Field documentation materials
- Decontamination materials
- Personal protective equipment (as required by project Health and Safety Plan)

3. METHODOLOGY

Coring Procedure (Conducted by Drilling Subcontractor):

The sampling procedure includes driving a 2-inch outside-diameter, 5-foot-long, push-probe soil sampler to the desired depth using a combination of hydraulic pressure and mechanical hammer blows. When the sampling depth is reached, the pin attaching the sampler's tip is released (if a tip is used), which allows the tip to slide inside the sampler (Macro-Core Sampler with removable plastic liner). The sampler is driven the length of the sampler to collect a soil core, which is then withdrawn from the exploration. When the sampler is retrieved from the borehole the drive head/cutting shoe is detached and the liner is removed. Soil cores are collected continuously to the full depth of the exploration unless otherwise specified in a project-specific sampling and analysis plan (SAP). Verify that the subcontractor decontaminates the sampling device (per SOP 1.2) prior to its initial use and following collection of each soil sample.

Logging and Soil Sample Collection:

Remove the soil core from the sampler for field screening, description, and placement into sample jars. Soil samples will be collected for field screening and possible chemical analysis on two foot intervals unless otherwise specified in a project-specific SAP. The sampling interval will be determined in the field based on recovery, soil variability, and evidence of contamination. Complete field screening as specified in SOP-2.1. Soil samples should be collected using different procedures for volatile on non-volatile analyses, as follows.

- **Volatile Analyses.** Sampling for volatile organics analysis (VOA) is different than other routine physical or chemical testing because of the potential loss of volatiles during sampling. To limit volatile loss, the soil sample must be obtained as quickly and as directly as possible. If a VOA sample is to be collected as part of a multiple analyte sample, the VOA sample portion will be obtained first. The VOA sample should be obtained from a discrete portion of the entire collected sample and should not be composited or homogenized. Sample bottles should be filled to capacity, with no headspace. Specific procedures for collecting VOA samples using the EPA Method 5035 are discussed in SOP 2.7.
- **Other Analyses.** Soil samples for non-volatile analyses will be thoroughly homogenized in a stainless steel bowl prior to bottling. Sample homogenizing is accomplished by manually mixing the entire soil

sample in the stainless steel bowl with a clean sampling tool until a uniform mixture is achieved. The sample jar should be filled completely.

Any extra soil generated during probing activities will be placed in Department of Transportation (DOT) approved drums.

Grab Groundwater Sample Collection:

Collect grab groundwater samples using a sampling attachment with a 4 to 5-foot-long temporary screen (decontaminated stainless steel or disposable PVC). Obtain samples using a peristaltic pump with new tubing for each boring. Record field parameters (e.g., temperature, conductivity, and pH) prior to sampling.

Backfilling the Excavation (Conducted by Drilling Subcontractor):

After sampling activities are completed, abandon each exploration in accordance with Oregon Water Resources Department (OWRD) regulations and procedures. The abandonment procedure typically consists of filling the exploration with granular bentonite and hydrating the bentonite with water. Match the surface completion to the surrounding materials.

Attachment B

Laboratory Data (CD-ROM)